Attorney Docket No. 14407US02

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In the Application of:

Ronald L. Mahany et al.

Serial No.: 10/692,959

Filed: October 24, 2003

For: WIRELESS PERSONAL LOCAL AREA NETWORK

Art Unit: 2616

Examiner: P.B. Nguyen

*Electronically filed on* 12/30/08.

By: /John A. Wiberg/
John A. Wiberg
Reg. No. 44,401

**DECLARATION UNDER 37 C.F.R. § 1.132**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Guy J. West, hereby declare the following:

1. I am a named inventor on the above-referenced U.S. Patent Application Serial No. 10/692,959, entitled "WIRELESS PERSONAL LOCAL AREA NETWORK" ("the '959 Application"), the pending claims of which are attached hereto as Appendix A.

2. Ronald L. Mahany (deceased), Alan G. Bunte, Ronald E. Luse, and Charles D. Gollnick are also named as co-inventors on the '959 Application.

3. I am also a named inventor on U.S. Patent Application Serial No. 08/239,267, entitled "MULTI-LEVEL, HIERARCHICAL RADIO-FREQUENCY COMMUNICATION SYSTEM," now U.S. Patent 6,006,100 ("the '100 Patent"), which claims priority to U.S. Patent Application Serial No. 07/876,776, U.S. Patent Application

Serial No. 07/854,115, U.S. Patent Application Serial No. 07/558,895, and U.S. Patent Application Serial No. 07/529,353 (the "Predecessor Applications").

4. Ronald L. Mahany, Alan G. Bunte, Stephen E. Koenck, Keith K. Cargin, Jr., George E. Hanson, Phillip Miller, Stephen H. Salvay, and Arvin D. Danielson are also named as co-inventors on '100 Patent.

5. To the extent that the subject matter claimed in the '959 Application is taught in the '100 Patent and/or its Predecessor Applications, such subject matter was invented by Ronald L. Mahany, Alan G. Bunte, and/or me.

6. The Engineering Development and Record Log (#275) that was prepared and signed by Ronald L. Mahany, dated September 21, 1989 – September 29, 1989, and is attached hereto as Appendix B, discloses the invention as claimed in the independent claims of the '959 Application as conceived by Ronald L. Mahany, Alan G. Bunte, and/or me.

7. I certify that all statements made herein of my own knowledge are true, and that all statements made herein on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001) and may jeopardize the validity of the application or any patent issuing thereon.

Guy J. West

21/APR/2008
Date

**APPENDIX A**
**PENDING CLAIMS OF SERIAL NO. 10/692,959**

10. A transceiver for use in a wireless network device that operates in a communication system that includes a radio network, the transceiver comprising:

a radio unit configured to communicate with the radio network;

wherein the transceiver is operable to enable the wireless network device to participate as a master device on the radio network, operable to control communications on the radio network.

11. The transceiver of claim 10 wherein the communication system further comprises a main communication network and wherein the transceiver is capable of communicating with the main communication network.

12. The transceiver of claim 11 further comprising a processor operable to control the communications of the radio unit with the radio network and capable of communicating with the main communication network.

13. The transceiver of claim 11 wherein the wireless network device is operable to participate as a slave on the main communication network.

14. The transceiver of claim 11 wherein the main communication network comprises a wired communication network.

15. The transceiver of claim 11 wherein the main communication network comprises a wireless communication network.

16. The transceiver of claim 10 wherein the transceiver comprises an integrated circuit.

17. The transceiver of claim 10 wherein the wireless network device is sized to be held by a user.

18. A transceiver for use in a mobile network device that operates in a communication system that includes a radio network, the transceiver comprising:

a radio unit configured to communicate with the radio network;

wherein the transceiver is operable to enable the mobile network device to participate as a master device on the radio network, operable to control communications on the radio network.

19. The transceiver of claim 18 wherein the communication system further comprises a main communication network and wherein the transceiver is capable of communicating with the main communication network.

20. The transceiver of claim 19 further comprising a processor operable to control the communications of the radio unit with the radio network and capable of communicating with the main communication network.

21. The transceiver of claim 19 wherein the mobile network device is operable to participate as a slave on the main communication network.

22. The transceiver of claim 19 wherein the main communication network comprises a wired communication network.

23. The transceiver of claim 19 wherein the main communication network comprises a wireless communication network.

24. The transceiver of claim 18 wherein the transceiver comprises an integrated circuit.

25. The transceiver of claim 18 wherein the mobile network device is sized to be held by a user.

26. The transceiver of claim 10 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network.

27. The transceiver of claim 10 wherein the transceiver enables the wireless network device to synchronize communications of a second wireless network device participating on the radio network.

28. The transceiver of claim 10 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network with a third wireless network device participating on the radio network.

29. The transceiver of claim 15 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

30. The transceiver of claim 15 wherein the transceiver enables the wireless network device to facilitate communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

31. The transceiver of claim 10 wherein the radio unit is configured to communicate with the radio network using spread spectrum signals.

32. The transceiver of claim 18 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network.

33. The transceiver of claim 18 wherein the transceiver enables the wireless network device to synchronize communications of a second wireless network device participating on the radio network.

34. The transceiver of claim 18 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network with a third wireless network device participating on the radio network.

35. The transceiver of claim 23 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

36. The transceiver of claim 23 wherein the transceiver enables the wireless network device to facilitate communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

37. The transceiver of claim 18 wherein the radio unit is configured to communicate with the radio network using spread spectrum signals.

38. A wireless network device for operating in a communication system that includes a radio network, the device comprising:

transmit circuitry configured to transmit signals on the radio network; and

receive circuitry configured to receive signals from the radio network;

wherein the device is operable to participate as a master device on the radio network, operable to control communications on the radio network.

39. The device of claim 38 wherein the communication system further comprises a main communication network and wherein the device is capable of communicating with the main communication network.

40. The device of claim 39 further comprising a processor operable to control the communications of the transmit and receive circuitry with the radio network and capable of communicating with the main communication network.

41. The device of claim 39 wherein the device is operable to participate as a slave on the main communication network.

42. The device of claim 39 wherein the main communication network comprises a wired communication network.

43. The device of claim 39 wherein the main communication network comprises a wireless communication network.

44. The device of claim 38 wherein the device is an integrated circuit.

45. The device of claim 38 wherein the device is operable to manage communications of a second wireless network device participating on the radio network.

46. The device of claim 38 wherein the device is operable to synchronize communications of a second wireless network device participating on the radio network.

47. The device of claim 38 wherein the device is operable to manage communications of a second wireless network device participating on the radio network with a third wireless network device participating on the radio network.

48. The device of claim 43 wherein the device is operable to manage communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

49. The device of claim 43 wherein the device is operable to facilitate communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

50. The device of claim 38 wherein the device comprises a PCMCIA card containing the transmit circuitry and the receive circuitry.

51. The device of claim 38 wherein the transmit circuitry is configured to transmit spread spectrum signals on the radio network and the receive circuitry is configured to receive spread spectrum signals from the radio network.

# APPENDIX B

#16701 - 16750

NORAND®
DATA SYSTEMS

## ENGINEERING DEVELOPMENT RECORD LOG

This book is the property of Norand® Corporation but may remain in your possession until termination of your employment with the company, at which time you shall surrender this book to the Department Director.

INSTRUCTIONS:

1. All engineering notes, sketches, schematics, etc., are to be recorded in this book.
2. Complete each sheet in its entirety.
3. Date and sign each log sheet.
4. All log sheets containing information which might have particular significance must be signed and dated by one witness who reads the sheet and understands its contents.

   NOTE: If there are co-inventors both should sign in the area marked writer, and a third party would be required as a witness.
5. Completed books are to be turned into Director's office for permanent filing.
6. UNDER NO CIRCUMSTANCES MAY ANY PAGE BE REMOVED FROM THIS BOOK.
7. When copies are required, the entire book is to be submitted to the duplicating room where the specified pages will be reproduced.
8. Under no circumstances may this book be duplicated for personal reasons or removed from the company premises, except by authority of the Department Director.

TIPS ON HOW TO USE THIS BOOK:

1. Use black ink or pencil. Do not use light blue, it will not reproduce.
2. Do not try to erase, if revisions are necessary, cross out and rewrite.
3. Clarity is essential but precision drawings are not required; therefore, free-hand sketches are acceptable.
4. Use of vinyl backing sheet under the page will help make a clear and contrasting entry.

Book No. 825 Assigned To Ron Mahany

BCMSA006642

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EXHIBIT
43
Jul-11-13-06

NORAND DATA SYSTEMS

## ENGINEERING LOG SHEET

PAGE____ OF____ PAGES 0016701

| TITLE | MODEL |
|---|---|

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BCMSA006643

| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|

Norand Part No. 910-075-000

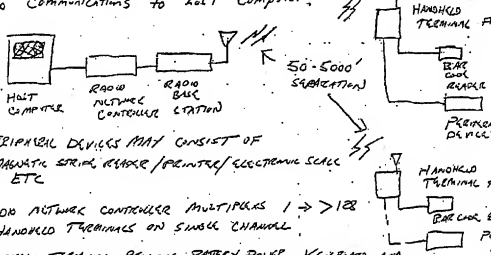
NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 1 OF PAGES 0016702

TITLE: PORTABLE, RADIO-LINKED DATA COMMUNICATION SYSTEM

MODEL: RT 3000 SERIES

PRIOR ART: Existing data collection systems utilizing bar code readers and radio communications to host computer.




PERIPHERAL DEVICES MAY CONSIST OF MAGNETIC STRIPE READER/PRINTER/ELECTRONIC SCALE ETC

RADIO NETWORK CONTROLLER MULTIPLEXES 1 -> >128 HANDHELD TERMINALS ON SINGLE CHANNEL.

HANDHELD TERMINAL PROVIDES BATTERY POWER, KEYBOARD AND DISPLAY FOR USER I/O, AND MAY INCLUDE AN COMPUTER FUNCTION TO PROVIDE LOCAL DATA PROCESSING

SYSTEM CONCEPT

LOGICAL STEP IS TO COMBINE HANDHELD FUNCTIONS, BATTERY, KEYBOARD, DISPLAY, SCANNER, ETC INTO A SINGLE UNIT. THIS CAN PROVIDE THE USER FREEDOM OF ONE HANDED SCANNING OPERATION, ELIMINATE TETHERING CABLES, PROMOTE EFFICIENT SCANNING OPERATION BY PLACING DISPLAYED INFORMATION DIRECTLY IN FRONT OF ITEM BEING SCANNED. UNFORTUNATELY THE ERGONOMICS OF SUCH A PRODUCT CONCEPT ARE QUITE DIFFICULT TO MANAGE. BOTH PRODUCT (TERMINAL) SIZE AND WEIGHT QUICKLY EXCEED THE LIMITS OF REASONABLE HANDHELD OPERATION WHEN SCANNER, RADIO, PROCESSOR, KEYBOARD, DISPLAY, AND ADEQUATE BATTERY CAPACITY TO POWER ALL COMPONENTS ARE INCLUDED IN A SINGLE UNIT. THIS IS PARTICULARLY THE CASE WHEN THE DISTANCE OVER WHICH RADIO COMMUNICATION MUST TAKE PLACE EXCEEDS A FEW HUNDRED FEET - NECESSITATING FAIRLY HIGH POWERED RADIO TRANSMITTERS AND HIGH CAPACITY, LOW-IMPEDANCE BATTERIES TO POWER THEM, I.E. INDOOR FACTORY ENVIRONMENTS WITH HIGH AMBIENT

WRITER [signature] DATE 9/21/89 WITNESS Steve Kowal DATE 10-2-89

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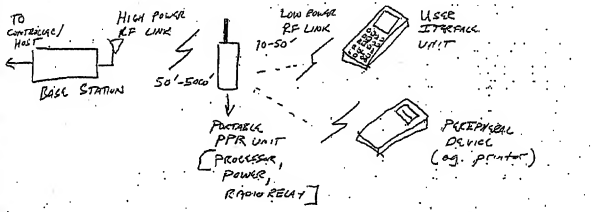
BCMSA006644

TITLE | MODEL

RF INTERFERENCE LEVELS AND NUMEROUS OBSTACLES TO GOOD RF SIGNAL PROPAGATION.

THE PROBLEMS OF ERGONOMICS CAN BE ALLEVIATED BY THE PORTABLE CONCEPT ILLUSTRATED BELOW:




THE PORTABLE USER INTERFACE UNIT CONTAINS KEYBOARD, DISPLAY, SCANNER, A LOW POWER RADIO TRANSCEIVER, AND A SIMPLE I/O PROCESSOR/CONTROLLER. BECAUSE RADIO COMMUNICATIONS ARE ONLY REQUIRED OVER A SHORT DISTANCE, BATTERY REQUIREMENTS ARE MINIMAL eg. A SINGLE 9V NI-CAD, OR A SINGLE RECHARGABLE LITHIUM CELL WITH SWITCHING POWER SUPPLY TO PROVIDE 5V. SIMPLICITY OF THE USER INTERFACE UNIT CIRCUITRY AND LOW POWER CONSUMPTION REQUIREMENTS ALLOW GOOD USER ERGONOMICS, SIZE AND WEIGHT.

THE P.I.R UNIT CONTAINS A COMPANION LOW POWER TRANSCEIVER FOR COMMUNICATION TO THE USER INTERFACE UNIT, A HIGH POWER TRANSCEIVER FOR COMMUNICATION TO THE HOST COMPUTER VIA THE BASE STATION; PROCESSOR AND MEMORY REQUIRED FOR LOCAL APPLICATION PROCESSING, AND A HIGH CAPACITY BATTERY.

WRITER [signature] | DATE 9/21/87 | WITNESS Steve Kounek | DATE 10-2-87

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 3 OF ___ PAGES 0016704

| TITLE | MODEL |
|---|---|

PORTABLE P.R.R USAGE

IN A TYPICAL PORTABLE OPERATION ENVIRONMENT THE PRR UNIT WOULD BE WORN ON A BELT OR STRAP, ALLOWING THE WEIGHT OF THE HEAVIEST COMPONENTS OF THE SYSTEM TO BE CARRIED WITHOUT CAUSING USER FATIGUE.

THE PRR UNIT IS ALSO DESIGNED TO ALLOW DIRECT INTERCONNECT BETWEEN IT AND THE RF USER INTERFACE UNIT. A MATING CONNECTOR IS PROVIDED TO ALLOW WIRED COMMUNICATION BETWEEN THE TWO UNITS, AND TO ALLOW THE PRR TO RECHARGE THE BATTERY IN THE USER INTERFACE UNIT WHILE THEY ARE MATED - ~~REQUIRING~~ ALLOWING THE BETTER OPERATING LIFE OF THE USER INTERFACE UNIT TO BE EXTENDED.

MECHANICALLY THE PRR INCORPORATES A GUIDING STRUCTURE WHICH HOLDS THE USER INTERFACE UNIT SECURELY BUT ALLOWS CONVENIENT REMOVAL OF THE USER INTERFACE UNIT WHEN DESIRED. THUS, WHEN THE PRR UNIT IS ATTACHED TO A BELT, IT SERVES AS A CONVENIENT HOLSTER FOR THE USER INTERFACE UNIT, ALLOWING THE USER TO DEVOTE BOTH HANDS TO OTHER TASKS DURING PERIODS WHEN THE DATA COMMUNICATION SYSTEM IS NOT BEING USED.

THE P.R.R ALSO INCLUDES AUXILIARY BATTERY INPUTS. IN THE BELTMOUNTED CONFIGURATION, ADDITIONAL BATTERY CAPACITY CAN BE DISTRIBUTED ON THE BELT, PROVIDING ADDITIONAL OPERATING TIME ~~BETTER~~ AGAIN WITHOUT INCREASING THE SIZE OR WEIGHT OF THE HANDHELD PORTION OF THE SYSTEM.

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| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|
| [signature] | 9/21/89 | Steve Kouck | 10-2-89 |

TITLE | MODEL

OTHER P.P.R CONFIGURATIONS

MANY OTHER P.P.R. CONFIGURATIONS ARE POSSIBLE:

* IN INDUSTRIAL OR MOBILE USAGE THE P.P.R. CAN BE IMPLEMENTED AS A FIXED MOUNTED MOBILE DEVICE POWERED FROM A VEHICULAR BATTERY - E.G. TRUCK OR FORKLIFT. THE USER INTERFACE UNIT COULD BE HOLSTERED IN THIS "P.P.R" WHEN NOT IN USE RECEIVING CONTINUOUS RECHARGING OF THE USER INTERFACE UNITS BATTERY. IT COULD THEN BE REMOVED AND OPERATED REMOTELY FROM THE VEHICLE SUBJECT TO THE LOW POWER RADIO LINK RANGE LIMITATION.

* IN INDOOR USAGE THE P.P.R. COULD BE CONFIGURED AS A FIXED UNIT OR "F.P.R" THE F.P.R COULD BE POWERED FROM THE A.C POWER LINE AND MOUNTED ON A WALL OR CEILING. ONE OR MORE USER INTERFACE UNITS COULD OPERATE REMOTELY, USING THE F.P.R TO RELAY DATA TO AND FROM THE HOST COMPUTER VIA THE HIGH POWER RADIO LINK IN THE F.P.R.

* THE F.P.R. FUNCTION COULD ALSO BE INCORPORATED INTO OTHER DEVICES TO PROVIDE HIGHER LEVELS OF SYSTEM INTEGRATION. AN EXCELLENT COMBINATION WOULD BE INSTALLING THE F.P.R FUNCTION INTO A RETAIL POINT OF SALE TERMINAL ALLOWING BAR CODE AND USER KEYED DATA TO BE REMOTELY ENTERED AND WIRELESS COMMUNICATIONS BETWEEN P.O.S. TERMINALS AND STORE CONTROLLERS.

* IN THE F.P.R. CONFIGURATION AN ALTERNATIVE WIRED INTERFACE CAN BE SUBSTITUTED FOR THE LONG RANGE RADIO LINK IF DESIRED.

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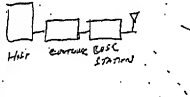
| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|
| R. Wilson | 9/21/89 | Steve Kench | 10-2-89 |

Norand Part No. 6910-075-000

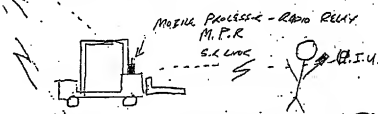
TITLE | MODEL

* IN AREAS REQUIRING ONLY SHORT RANGE COMMUNICATIONS, THE P.P.R/M.P.R./F.P.R FUNCTION CAN BE ELIMINATED COMPLETELY, ALLOWING PORTABLE INTERFACE UNITS TO COMMUNICATE DIRECTLY WITH THE COMMUNICATIONS CONTROLLER VIA A LOW POWER BASE STATION TRANSCEIVER. AGAIN, THIS IS A GOOD FIT FOR RETAIL POINT OF SALE APPLICATIONS, WHERE THE P.O.S. TERMINAL ACTS AS A LOCAL HOST COMPUTER ACCEPTING REMOTELY KEYED DATA AND BAR CODE SCANNER OUTPUT.

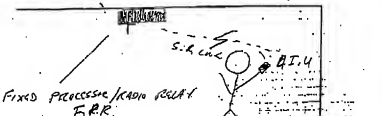
ILLUSTRATIONS OF POSSIBLE DATA COLLECTION SYSTEM ARCHITECTURES




HANDHELD OPERATION - FIGURE (1)




MOBILE OPERATION FIGURE (1A)




FIXED OPERATION FIGURE (1B)

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Norand Part No. 910-075-000

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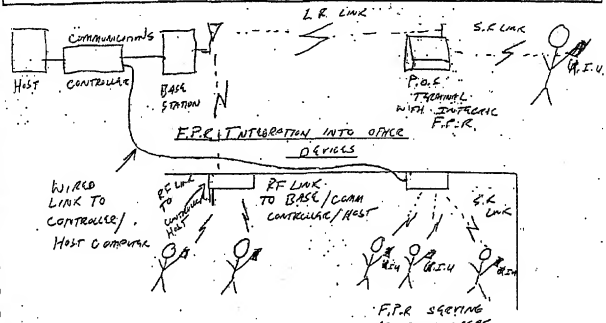
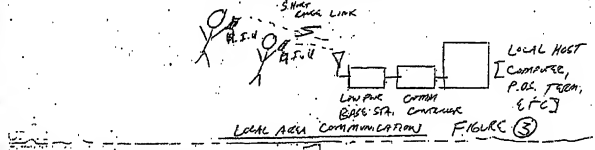
TITLE

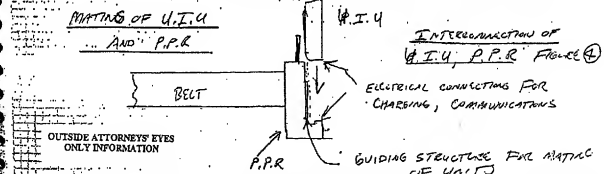
MODEL




NETWORKED F.P.RS — FIGURE (2)




LOCAL AREA COMMUNICATION FIGURE (3)




| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|
| | 9/21/89 | ~~Steve Kmak~~ | 10-2-89 |

Norand Part No. 910-075-000

BCMSA006649

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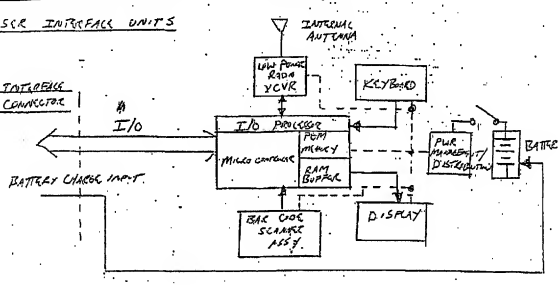
TITLE | MODEL

HARDWARE ARCHITECTURE — FIGURE (5)

USER INTERFACE UNITS




USER INTERFACE PERIPHERALS — EXAMPLES

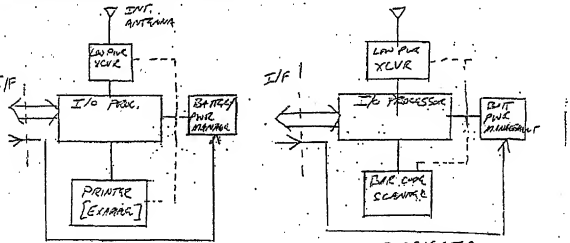



FIGURE (6A) PRINTER

DEDICATED SCANNER FIGURE (6B)

OTHER OPTIONS - MAG-STRIPE, SMART CARD, RF TAG, ETC.

WRITER T.J. Phillips | DATE 9/21/89 | WITNESS Steve Koenck | DATE 10-2-89

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TITLE | MODEL

P.P.R / M.P.R / F.P.R ARCHITECTURES

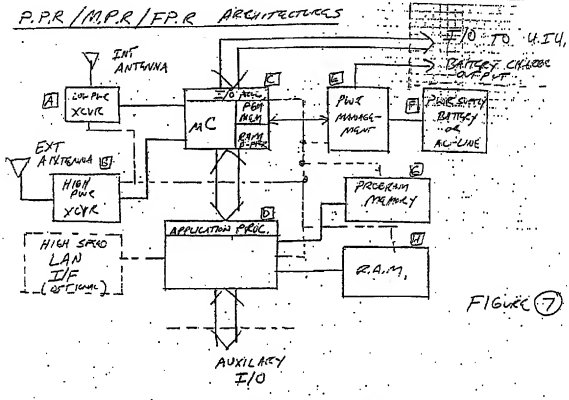


FIGURE (7)

THERE ARE NUMEROUS POSSIBLE VARIATIONS OF THIS ARCHITECTURE. FOR EXAMPLE, IF ONLY A STORE AND FORWARD OPERATION IS REQUIRED, D, E, H CAN BE ELIMINATED; REDUCING COST. IT MAY ALSO BE POSSIBLE TO COMBINE TAL I/O PROC AND APPLICATIONS PROCESSOR IN A SINGLE, MORE POWERFUL DEVICE.

LASTLY, IF THE LOCAL AREA COMMUNICATION SCHEME OF FIGURE (3) IS REQUIRED, THE HIGH POWER TRANSCEIVER B CAN BE OMITTED. RAM IN THIS INSTANCE THE APPLICATION PROCESSOR CAN BE CONFIGURED (PROGRAMMED)

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| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|
| | 9/21/89 | Steve Kund | 10-2-89 |

NORAND DATA SYSTEMS

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TITLE

MODEL

RADIO LINK CONSIDERATIONS

NEW FCC REGULATIONS ENACTED 6/89 PERMIT WIDER LATITUDE IN SELECTION OF SHORT RANGE COMMUNICATION APPROACHES REQUIREMENT IS THAT RADIATED FIELD STRENGTHS NOT EXCEED CLASS B COMPUTER EMISSIONS LIMITS WITH FEW RESTRICTIONS ON FREQUENCY OF OPERATION AND NO DUTY CYCLE LIMITATIONS. UTILIZING THESE REGULATIONS, VERY COST EFFECTIVE SHORT RANGE RADIO LINKS CAN BE UTILIZED. THE PREFERRED IMPLEMENTATION IS TO USE THE WELL KNOWN TECHNIQUE OF SEMI DUPLEX OPERATION BETWEEN THE TRANSCEIVER IN THE P.P.R UNIT AND AND THE U.I.U AND OTHER PERIPHERAL DEVICES. THE SELECTION OF A DATA TRANSMISSION (MODULATION) METHOD IS ARBITRARY - EITHER AMPLITUDE OR ANGLE MODULATED SIGNALS CAN BE USED -- DEPENDING ON OTHER SYSTEM CONSTRAINTS. FOR ILLUSTRATIVE PURPOSES FSK TRANSMISSION IS INDICATED HERE.

U. I. U. TRANSCEIVER

P.P.R. TRANSCEIVER

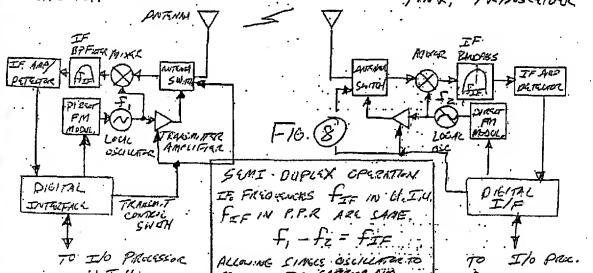


FIG. 8

SEMI-DUPLEX OPERATION

IF FREQUENCIES $f_{IF}$ IN U.I.U. $f_{IF}$ IN P.P.R ARE SAME.

$f_1 - f_2 = f_{IF}$

ALLOWING SINGLE OSCILLATOR TO SERVE AS TX CARRIER AND RX LOCAL OSCILLATOR

WRITER

DATE 9/12/89

WITNESS Steve Koenck

DATE 10-2-89

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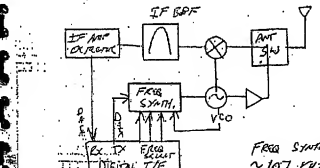
NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 12 OF ____ PAGES 0016711

TITLE | MODEL

THE SIMPLIFIED ILLUSTRATION IN FIG (E) CAN BE EXPANDED TO INCLUDE OTHER TECHNIQUES WHICH ARE COMMONLY KNOWN IN THE RADIO ART: AM USE OF MULTIPLE CONVERSION RECEIVERS, e.g. $f_{IF}$ OF 10.7 MHZ, 455 KHZ IN EACH RECEIVER AM; USE OF FREQUENCY SYNTHESIS OR CRYSTAL SELECT CIRCUITS TO PROVIDE MULTIPLE CHANNEL CAPABILITY — FREQUENCY DIVISION MULTIPLEXING OR INTERFERENCE AVOIDANCE ETC. FREQUENCY DIVISION MULTIPLEXING WOULD BE IMPORTANT IN CASES WHERE MANY P.S.R/U.I.U (and PERIPHERALS) COMBINATIONS MAY BE OPERATING IN NEAR PROXIMITY. EACH P.P.R CAN BE ASSIGNED A UNIQUE OPERATING FREQUENCY, AVOIDING INTERFERENCE BETWEEN USERS, AND ALLOWING EACH TO HAVE FULL ACCESS TO THE AVAILABLE SYSTEM BANDWIDTH (AVAILABLE DATA TRANSMISSION RATE). INTERFERENCE AVOIDANCE CAPABILITY IS IMPORTANT BECAUSE OF THE POTENTIAL FOR INTERFERENCE FROM OTHER DIGITAL DEVICES OR OTHER COMMUNICATIONS DEVICES. TO AVOID INTERFERENCE THE P.P.R. CAN MONITOR AVAILABLE CHANNELS AND SELECT ONE WHICH IS CLEAR. U.I.U.'S AND PERIPHERAL DEVICES ~~USE~~ ACK SLAVE PACKAGE PROGRAMMED TO OPERATE ON THE SELECTED FREQUENCY BY PLUGGING THEM INTO THE P.P.R INTERFACE CONNECTOR. FREQUENCY SELECTION IS THEN DOWN-LOADED TO THE SLAVE DEVICE. POLICY TWO ALTERNATIVE FREQUENCIES CAN BE DOWNLOADED IN CASE MOBILE OPERATION




WRITTEN [signature] DATE 9/21/89 WITNESS Steve Found DATE 10-2-89

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BCMSA006653

NORAND DATA SYSTEMS

**ENGINEERING LOG SHEET** PAGE 1 OF ____ PAGES 0016712

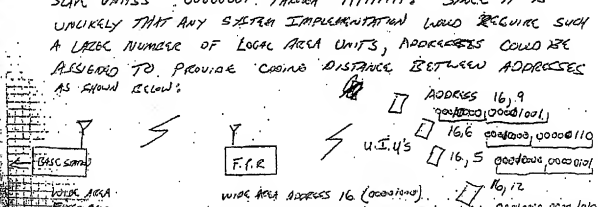
| TITLE | MODEL |
|---|---|

RESULTS IN MOVEMENT TO AN AREA UNDER THE FIRST SELECTED FREQUENCY IS SUBJECT TO INTERFERENCE. LOSS OF COMMUNICATIONS FOR AN UNACCEPTABLY LONG PERIOD WOULD TRIGGER BOTH P.P.R AND SLAVE UNITS TO MOVE TO THE ALTERNATIVE, SECOND FREQUENCY.

COMMUNICATIONS HANDLING BETWEEN P.P.R AND U.I.U.'S & PERIPHERALS

ADDRESSING

COMMUNICATIONS BETWEEN MASTER (P.P.R/M.P.R./F.P.R) AND SLAVE UNITS (U.I.U / PERIPHERALS) REQUIRES THAT UNITS BE IDENTIFIED BY UNIQUE ADDRESSES. SINCE THE MASTER UNITS ARE ALSO REQUIRED TO HAVE ADDRESSES. WITHIN THE CONTEXT OF THE LONG RANGE (WIDE AREA) COMMUNICATION SYSTEM, IT IS LOGICAL TO USE THAT ADDRESS, WITH AN EXTENSION, TO PROVIDE ADDRESSING FOR LOCAL AREA COMMUNICATIONS. FOR EXAMPLE, IF THE WIDE AREA SYSTEM UTILIZES A SINGLE BYTE FOR ADDRESSING (128 UNITS) THE ADDITION OF A SECOND BYTE WOULD ALLOW UP TO $128^2$ LOCAL AREA UNITS TO COMMUNICATE WITH A SINGLE P.P.R. THE P.P.R COULD BE GIVEN EXTENSION ADDRESS 00000000, SLAVE UNITS 00000001 THROUGH 11111111. SINCE IT IS UNLIKELY THAT ANY SYSTEM IMPLEMENTATION WOULD REQUIRE SUCH A LARGE NUMBER OF LOCAL AREA UNITS, ADDRESSES COULD BE ASSIGNED TO PROVIDE CODING DISTANCE BETWEEN ADDRESSES AS SHOWN BELOW:

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| | 9/22/89 | Steve Krenik | 10-2-89 |

Part No. 910-075-000

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ENGINEERING LOG SHEET PAGE 10 OF ____ PAGES 0016713

TITLE | MODEL

USE OF THE ADDRESS/EXTENSION TYPE OF ADDRESSING PREVENTS U.I.U.'S THAT ARE ASSIGNED TO A GIVEN MASTER UNIT FROM COMMUNICATING ACCIDENTLY WITH ANOTHER MASTER UNIT ON THE SAME FREQUENCY. SMARTER ADDRESSING FIELDS MIGHT BE USED IF SYSTEM CONSIDERATIONS ELIMINATE THE POSSIBILITY OF 2 MASTER UNITS UTILIZING THE SAME FREQUENCY, OR IF SYSTEM FEATURES SUCH AS ROAMING ARE IMPLEMENTED.

ANOTHER CONSIDERATION IN ADDRESSING IS PRIORITIZING COMMUNICATIONS. COMMUNICATIONS BETWEEN U.I.U'S AND THE MASTER UNIT SHOULD TAKE PRECEDENCE OVER COMMUNICATIONS TO PERIPHERALS, WHICH CAN RUN AS BACKGROUND OR SECONDARY OPERATIONS.

THE PREFERRED METHOD OF COMMUNICATIONS IS TO USE A PACKET ORIENTED PROTOCOL, WITH VARIABLE PACKET LENGTH. ~~PROTOCOL~~ MINIMUM AND MAXIMUM ALLOWED PACKET LENGTHS CAN BE DETERMINED FOR EACH TYPE OF DEVICE BASED UPON ITS INDIVIDUAL CHARACTERISTICS - E.g. a U.I.U. MAY HAVE MIN PACKETS OF 1 CHARACTER AND A MAX OF N, WHERE N IS THE TOTAL NUMBER OF CHARACTERS WHICH CAN BE DISPLAYED ON THE U.I.U. SINCE THE NUMBER OF INDIVIDUAL UNITS -- U.I.U.'S OR PERIPHERALS -- IN COMMUNICATION WITH A GIVEN P.P.R. OR OTHER MASTER IS LIKELY TO BE RELATIVELY SMALL DUE TO THE SHORT RADIUS OF COMMUNICATION OF THE SHORT RANGE LINK, A CONTENTION BASED ACCESS SCHEME IS MOST DESIRABLE. AN APPROACH SUCH AS RTC IS ONE POSSIBLE CANDIDATE. TRADITIONAL ACCESS SCHEMES SUCH AS CSMA ARE UNACCEPTABLE BECAUSE SEMI DUPLEX OPERATION DOES NOT ALLOW ANY SLAVE UNITS (U.I.U.'S/PERIPHERALS) TO MONITOR EACH OTHERS TRANSMISSIONS. A HARDWARE VARIATION FOR THE SHORT RANGE RADIO COMPONENT WHICH DOES ALLOW CSMA IS SHOWN ON THE FOLLOWING PAGE.

WRITER [signature] DATE 9/22/89 | WITNESS Steve Kronck DATE 10-2-89

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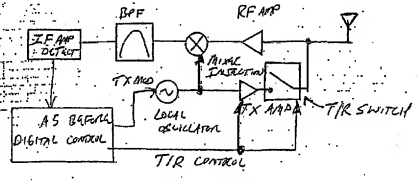
NORANS DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 17 OF ____ PAGES 0016714

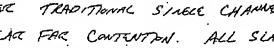
| TITLE | MODEL |
|---|---|




## P.P.R TRANSCEIVER

IN THIS CONFIGURATION, ~~WHEN THE P.P.R BEGINS TO RECEIVE~~ NORMALLY THE P.P.R TRANSMITTER AMP AND T/R SWITCH ARE MAINTAINED IN A TRANSMIT OFF CONDITION, SWITCH OPEN, NO BIAS APPLIED TO TRANSMIT AMP. WHEN RECEIPT OF A VALID MESSAGE BEGINS, THE T/R LINE IS ACTUATED, CAUSING AN UNMODULATED SIGNAL TO BE TRANSMITTED AS A "CHANNEL BUSY" TONE FOR ALL SLAVE UNITS TO MONITOR. THE RF AMP IS NECESSARY TO PROVIDE ISOLATION AGAINST THE RECEIVE MIXER INJECTION RADIATING AT HIGH LEVEL AND APPEARING AS A BUSY TONE. A SINGLE STAGE CAN PROVIDE ABOUT 30 dB OF REVERSE ISOLATION. THE T/R SWITCH WOULD BE IMPLEMENTED WITH A PIN DIODE - SIMPLE AND INEXPENSIVE.

A CSMA ACCESS PROTOCOL USING THIS HARDWARE APPROACH TO CREATE A BUSY TONE HAS A DISTINCT ADVANTAGE OVER TRADITIONAL SINGLE CHANNEL CSMA -- ELIMINATION OF NEAR FAR CONTENTION. ALL SLAVE UNITS WITHIN RANGE OF THE MASTER UNIT CAN HEAR THE BUSY TONE, AVOIDING THE CAPTURE BELOW WHERE SLAVE 1 IS TRANSMITTING TO THE MASTER, SLAVE 2 OUT OF RANGE OF SLAVE 1, SENDS THE CHANNEL "SLAVE" AND TRACKING SLAVE 1'S TRANSMISSION

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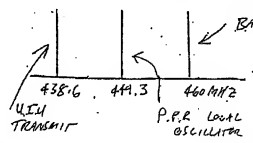
| [signature] | 11/22/89 | Steve Knack | 10-2-89 |

TITLE | MODEL

THE PRECEDING DISCUSSION ASSUMES COMPLETE INDEPENDENCE OF SHORT RANGE AND LONG RANGE COMMUNICATIONS LINK HARDWARE. THE LONG RANGE LINK COULD BE UHF, VHF, SPREAD SPECTRUM ETC OPERATING RESPECTIVELY AT 450 MHZ OR 800 MHZ, 150 MHZ, 902-928 MHZ, WHILE THE SHORT RANGE LINK COULD OPERATE ANYWHERE IN THE FREQUENCY BAND UNDER FCC CLASS B LIMITS. LIKELY SPECTRUM FOR SHORT RANGE OPERATION COULD BE UHF TV BAND 470-800 MHZ, OR 1.1 - 1.3 GHZ WHICH IS LITTLE UTILIZED.

A POSSIBLE MEANS OF SIZE, COST, POWER REQUIREMENT REDUCTION IS TO COMBINE LONG RANGE AND SHORT RANGE FUNCTIONS IN A SINGLE TRANSCEIVER IN THE MASTER UNITS. IN A CRYSTAL CONTROLLED DESIGN, THIS IS ACCOMPLISHED BY EITHER USING A CRYSTAL BANK SWITCH TO SELECT BETWEEN LONG RANGE AND SHORT RANGE FREQUENCIES, OR BY OPERATING THE SHORT RANGE LINK ON THE IMAGE OF THE LONG RANGE LINK RECEIVER. EXAMPLE USING UHF, 10.7 MHZ IF




P.P.R IS CAPABLE OF RECEIVING BOTH L.R. BASE, AND U.H.F. MODULATION OF P.P.R LOCAL OSCILLATOR PROVIDES RETURN LINK TO U.H.F.

WRITER | DATE 9/22/89 | WITNESS Steve Kovach | DATE 10-2-89

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NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 15 OF ___ PAGES

0016716

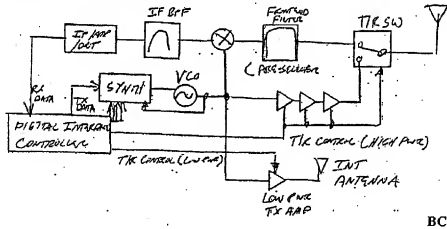
TITLE

MODEL

THIS APPROACH IS PRACTICAL IN SOME SITUATIONS, BUT IS TO BE AVOIDED IN SITUATIONS WHERE INTERFERENCE AT THE IMAGE IS A POSSIBILITY (DUE TO ALLOCATION OF FREQUENCIES TO HIGH PWR SOURCES) OR WHERE CONTENTION BETWEEN L.R. AND SHORT RANGE COMMUNICATIONS WILL OCCUR FREQUENTLY, E.G. WHEN THE LR LINK USES A POLLED PROTOCOL.

IN A SYNTHESIZED DESIGN, SEPARATE CHANNELS FOR LONG RANGE AND SHORT RANGE CHANNELS CAN BE ESTABLISHED WITH TO MASTER UNIT USING TDM TECHNIQUES TO MULTIPLEX BETWEEN THE TWO LINKS.

HARDWARE ARCHITECTURE FOR THE MASTER UNIT RADIO IS SIMILAR TO THE SYNTHESIZED RADIO DIAGRAM PRESENTED EARLIER, EXCEPT FOR THE ADDITION OF A HIGH POWER TRANSMITTER AND A SECOND ANTENNA. IN GENERAL, THE HIGH POWERED TRANSMITTER WILL USE AN EXTERNAL WHIP TYPE ANTENNA, WHICH THE LOW PWR LINK WILL USE AN INTERNAL ANTENNA FOR TRANSMISSION BECAUSE OF THE NEED TO CONTROL RADIATED SIGNAL STRENGTH TO MEET FCC EMISSIONS LIMITS.

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| [signature] | 9/26/89 | [signature] | 10-2-89 |

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NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 16 OF ___ PAGES 0016717

TITLE

MODEL

9/29

IN THIS APPROACH THE FREQUENCY SYNTHESIZER IS PROGRAMMED TO ALTERNATELY TX & RX BETWEEN MINOR INJECTION FREQUENCIES FOR THE HIGH POWER AND LOW POWER CHANNELS. ACCORDINGLY, LONG HAUL AND SHORT RANGE PROTOCOLS MUST ALLOW PERIODS WHEN COMMUNICATION CAN BE SUSPENDED. THE LOW PWR COMMUNICATION CHANNEL MUST BE SELECTED TO FALL WITHIN THE BANDWIDTH OF THE RECEIVER PRE-SELECTOR FILTER. IF THE SAME INTERMEDIATE FREQUENCIES ARE ACCEPTABLE IN BOTH LONG RANGE AND SHORT RANGE SYSTEMS THE SAME-DUPLEX SCHEME OUTLINED EARLIER CAN BE IMPLEMENTED. DIFFERING IF'S CAN BE SELECTED IF SYSTEM REQUIREMENTS DICTATE A NEED. FOR COST REASONS IT IS BEST TO MAINTAIN SEMI DUPLEX OPERATION IN THE U.I.U.'S AND PERIPHERICS, AND REQUIRE THE P.P.T TO SWITCH BETWEEN TX AND RX FREQUENCIES AS IT WOULD IN A TRADITIONAL SIMPLEX TRANSCEIVING SYSTEM.

BCMSA006659

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|---|---|---|---|
| | 9/29/89 | Steve Krench | 10-2-89 |

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ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016718

TITLE: PORTABLE DOOR LINKED COMMUNICATIONS SYSTEM | MODEL:

ADDITIONS: ENCRYPTION — KEY FOR PC FEATURES REQUIRING SECURITY — CHECK VERIFIER MAG CARD.

BCMSA006660

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Norand Part No. 910-075-000

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016719

TITLE: FREQUENCY HOP CONCEPTS / INDUSTRIAL AP'S

MODEL:

WHY FREQUENCY HOP?

CONCERNS ABOUT SYSTEM RANGE / AND INTERFERENCE REJECTION WITH D.S. SYSTEMS IN A NOISY, UNREGULATED ENVIRONMENT. F.H. POTENTIALLY OFFERS BETTER INTEREST THAN D.S., CONSIDERING DESIRED DATA RATES AND AVAILABLE BANDWIDTH. D.S. POTENTIALLY OFFERS BETTER MULTIPATH IMMUNITY

FCC PROPOSED RULES

FREQUENCY HOP
- 50 FREQ IN PSR SEQUENCE
- 100 ms MAX ON CHANNEL IN 5 SEC PERIOD
- 500 Hz MAXIMUM BANDWIDTH
- NO FREQ REPEATS IN SEQUENCE

DATA RATE / RADIO TECHNOLOGY OPTIONS

① USE FULL BW ALLOWED, 250 KBIT FM
~ 500 KBIT QPSK

DISPERSIVE CHANNEL — MULTIPATH ISSUES
COMPLEX IMPLEMENTATION
DC COUPLED DATA
52 AVAILABLE FREQUENCIES
COST?

② USE REDUCED BW, CONVENTIONAL FM. APPROACH
MANCHESTER DATA ALLOWS AC COUPLING
COMMERCIAL FM FILTERS ~ 230 KHz BW ALLOWS 75 KBAUD
SPACE 300 KHz CHANNELS ~ 85 FREQUENCIES
400 KHz CHANNELS ~ 65 FREQUENCIES BETTER ADJ CHAN

③ USE PLESSEY CT-2 RECEIVER SET
~ 80 KBit MAXIMUM DATA RATE WITH ~ 12 KHz CCC BW
DIRECT CONVERSION - NO IF SWITCHING FREQ CRYSTALS
WILL BE LOW COST
NO CLOCK RECOVERY REQUIRED - DATA OUT - USE HOLD
CHANNELS AT 250 KHz SPACING — 7. 104 CHANNELS
SIMPLE, RISK IS AVAILABILITY

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TITLE: FREQUENCY HOP. CONTINUED | MODEL:

OF THESE ALTERNATIVES (3) IS MOST DESIRABLE
(2) IS BEST FALL BACK POSITION

OTHERS ?

PROTOCOL CONSIDERATIONS

BIGGEST ISSUE WITH F. HOPPING IS ACQUIRING AND MAINTAINING HOPPING SYNCHRONIZATION, WHILE ALLOWING FLEXIBILITY IN DATA COMMUNICATIONS.

FOR HOPPING IT IS DESIRABLE TO UTILIZE FIXED FRAME LENGTHS, THIS ALLOWS PORTABLE UNITS TO POWER DOWN OR SLEEP AND AWAKEN THE SYSTEM FULLY SYNCHRONIZED AND READY TO TRANSMIT OR RECEIVE.

FOR DATA COMMUNICATIONS, IT IS DESIRABLE TO ALLOW FLEXIBILITY IN FRAME LENGTH, BECAUSE MESSAGE LENGTHS DIFFER FROM APPLICATION TO APPLICATION — ALSO BASE → TERMINAL, TERMINAL → BASE LENGTHS MAY DIFFER IN THE SAME APPLICATION.

WITH THE PROPOSED 5 SEC SEQUENCE LENGTH PROVISIONS OF THE RULES, ACQUISITION IS FAR LESS OF A CONCERN THAN PREVIOUSLY WITH THE 30 SEC PROVISIONS. SIMPLE APPROACHES EASILY ALLOW GUARANTEED ACQUISITION TIMES OF LESS THAN 10 SECONDS AT INITIAL POWER UP, WITH REASONABLE ACCURATE TIME KEEPING FUNCTIONS WITHIN TERMINALS, AND PERIODIC MEANS OF UPDATING TIMING EMPLOYED WITHIN THE PROTOCOL.

THE AVAILABILITY OF HIGHER DATA RATES EASES SOME OF THE CONCERNS ABOUT OBTAINING FULLY VARIABLE MESSAGE LENGTH CAPABILITIES -- THE EMPHASIS IN SYSTEM PERFORMANCE IS GENERALLY RESPONSE TIME RATHER THAN THROUGHPUT, AND IF MESSAGES RUN LONGER THAN A FIXED FRAME LENGTH THE REMAINDER OF THE FRAME CAN BE FILLED WITH REQUISITE ERROR CONTROL INFORMATION TO RECOVER RETRANSMISSION REQUIREMENTS

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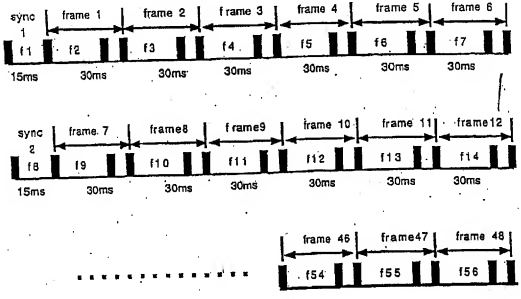
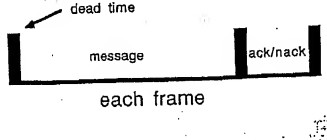
TITLE | MODEL

A DIAGRAM ILLUSTRATING A FREQUENCY HOPPING PROTOCOL BASED UPON SLOTTED ALOHA CONCEPTS IS SHOWN BELOW. FIXED FRAME LENGTHS ARE AN INHERENT FEATURE OF S.A PROTOCOLS USED ON SINGLE CHANNEL SYSTEMS, SO APPLICATION OF S.A. IN FREQUENCY HOPPING IS STRAIGHTFORWARD.

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NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 4 OF ___ PAGES 0016722

TITLE | MODEL

THE PROTOCOL UTILIZES TWO BASIC TYPES OF FIXED FRAMES: SYNC FRAMES. ARE USED TO AID INITIAL ACQUISITION, AS TIMING MARKERS TO AID UNITS ALREADY SYNCHRONIZED IN MAINTAINING SYNCHRONIZATION BY PROVIDING SYSTEM MASTER CLOCK INFORMATION, AND FOR COMMUNICATING SYSTEM INFORMATION. SYNC FRAME TRANSMISSIONS ALWAYS ORIGINATE AT THE BASE STATION WHICH SERVES AS A SYSTEM MASTER CONTROLLER.

COMM FRAMES ARE USED FOR ALL COMMUNICATIONS. BOTH MASTER TO REMOTE, AND REMOTE TO REMOTE COMMUNICATIONS ARE POSSIBLE; ALTHOUGH IN OUR TRADITIONAL APPLICATIONS, MASTER/REMOTE COMMUNICATIONS ARE SUFFICIENT TO PROVIDE THE REQUIRED FUNCTION. COMM. FRAMES CONSIST OF A MESSAGE FIELD, AND AN ACKNOWLEDGE FIELD.

EACH FRAME (SYNC OR COMM) UTILIZES A DIFFERENT FREQUENCY IN THE HOPPING SEQUENCE ($f_1, f_2, f_3 \ldots f_{50}$ IN THE diagram) WHICH IS STORED IN MEMORY IN EACH UNIT. ALL UNITS EMPLOY INTERNAL TIME KEEPING FUNCTIONS TO MAINTAIN HOPPING SYNCHRONIZATION AT THE FRAME BOUNDARIES. FRAME LENGTH IS USER PROGRAMMABLE, DEPENDING ON THE MAXIMUM EXPECTED INFORMATION BLOCK TRANSMISSION AND SUBJECT TO THE 100ms MAXIMUM DWELL ON FREQUENCY PROVISION OF THE RULES. LENGTH OF SYNC FRAMES IS FIXED BY SYSTEM COMMUNICATION REQUIREMENTS. VARIABLE COMM FRAME LENGTH ALLOWS RESPONSE TIME IMPROVEMENTS FOR SYSTEM INSTALLATIONS WHERE ONLY SHORT MESSAGE TRANSMISSIONS ARE REQUIRED.

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NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016723

| TITLE | MODEL |
|---|---|

COMMUNICATIONS SESSIONS

A COMMUNICATION SESSION CAN BE INITIATED BY EITHER THE BASE OR A PORTABLE UNIT. COMM FRAMES (Frame1, Frame2, Frame N) CAN BE EITHER RANDOM ACCESS FRAMES OR ASSIGNED FRAMES. GENERALLY ASSIGNED FRAMES WILL BE USED FOR BASE INITIATED SESSIONS ONLY, BUT THEY COULD BE USED FOR PORTABLE INITIATED SESSIONS AS WELL, IF DESIRED.

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# ENGINEERING LOG SHEET

PAGE____ OF ____ PAGES 0016724

| TITLE | MODEL |
|---|---|

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TITLE: GAUSSIAN / G.T. FILTERS - $\alpha, \beta$ to $W_o, Q$ CONVERSION | MODEL:

WILLIAMS PROVIDES POLE LOCATIONS FOR VARIOUS FILTER TYPES IN COMPLEX FORM ~ $S - \alpha \pm j\beta$. THIS REQUIRES INPUT IN $W_o, Q$ FORM, CONVERSION IS

$$W_o = \sqrt{\alpha^2 + \beta^2} \qquad Q = \frac{W_o}{2\alpha}$$

FOR COMPLEX POLE PAIRS, NORMALIZED TO 1 RAD/sec

TO DENORMALIZE USE STANDARD METHOD

$$W_o' = W_c W_o$$

$$Q' = Q$$

FROM WILLIAMS — 6 dB GAUSSIAN TRANSITIONAL

| n | REAL $-\alpha$ | IMAGINARY $\pm j\beta$ | $W_o$ | Q |
|---|---|---|---|---|
| 3 | .9622 | 1.2214 | | |
| | .9776 | | | |
| 4 | .7940 | .5029 | .940 | .592 |
| | .6304 | 1.5407 | 1.665 | 2.641 |
| 5 | .6190 | .8254 | 1.03172 | .83337 |
| | .3559 | 1.5688 | 1.60866 | 2.24 |
| | .6650 | | .6650 | |

LINEAR PHASE, 0.5° EQUIRIPPLE ERROR

| | | | |
|---|---|---|---|
| 3 | .6969 | 1.1318 | |
| | .8257 | | |
| | .7448 | .5133 | |
| | .6037 | 1.4983 | |
| | .6775 | .9401 | |
| | .5412 | 1.8256 | |
| | .7056 | | |

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NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 1 OF ____ PAGES 0016726

TITLE: UNIDEN HUMIDITY /TEMP CYCLING

MODEL:

INVESTIGATE TX OSC DRIFT OF UNIDEN RADIO BOARDS

1ST PASS

5 BOARDS CONTROL
5 BOARDS CT201 → 22pF NPO
5 BOARDS - REMOVE OUTPUT TUNED CIRCUIT

CONTROL GROUP

| | | |
|---|---|---|
| 433A | 461.0625 | #6 |
| 398A | 469.9825 | # 5R |
| 317A | " | #49 |
| 656A | 450.3875 | #1 |
| 691A | " | #5 |

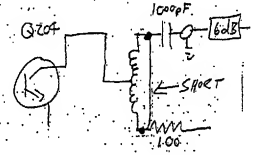
REPLACE TRIMMAC

| | | |
|---|---|---|
| 770 | 469.9625 | #1 |
| 784 | 461.0625 | #7 |
| 730 | 461.0625 | #8 |
| 683 | 450.3875 | #10 |
| 722 | 450.3875 | #9 |

(ENGINEERING SAMPLE)

DISCONNACT MULTIPLIAR

| | | |
|---|---|---|
| 705 | 450.3875 | #8 |
| 341 | 461.0625 | #14 |
| 728 | 461.0625 | #9 |
| 672 | 469.9625 | #50 |
| 721 | 469.9625 | #51 |

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ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016727

| TITLE | MODEL |
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ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016728

| TITLE | MODEL |
|---|---|

AMBIENT TEMP 21°C

CONTROL GROUP

| | | | |
|---|---|---|---|
| 398 | #52 | 469.96243 | 250Ω @ -111 |
| 317 | 49 | .96237 | AFTER 2 MEASURE |
| | | 469.96231 | 230Ω @ -112 |
| | | .96200 | |
| 650 | 1 | 450.38466 | 243Ω @ -112 |
| | | .38459 | |
| 641 | 5 | 450.38719 | 257. @ -112 |
| | | .38709 | |
| 433 | 6 | 461.06241 | 240 @ -111 |
| | | .06237 | |

TRIMMER REMOVED

| | | |
|---|---|---|
| 730 | #8 | 461.06299 |
| 683 | #10 | 450.38518 |
| 722 | #9 | 450.38657 |
| 784 | #7 | 461.06112 |
| 707 | #1 | 469.96055 |

MULTIPLIER DISCONNECTED

| | | 32 | |
|---|---|---|---|
| 341 | 14 | 19.210948 | (USE AUTO TRIG) |
| 692 | 50 | 19.581788 | |
| 705 | #8 | 18.766155 | |
| 728 | #9 | 19.210951 | |
| 721 | 51 | 19.581787 | |

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

BCMSA006670

| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|

Norand Part No. 910-075-000

NORAND DATA SYSTEMS

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TITLE | MODEL

6 TRIMMERS

| | | |
|---|---|---|
| 1 | 305 ∠ -89.6 | |
| 2 | ~~1230 ∠ -87.6~~ | 1176 ∠ -87.8 |
| 3 | 695 ∠ -89.6 | |
| 4 | 446 ∠ -87.2 | |
| 5 | 959 ∠ -89.6 | |
| 6 | 302 ∠ -87.5 | |

7 READINGS NOT SURE V-I METER WORKING

AFTER SOAK

| | | |
|---|---|---|
| 296 | -89.6 | W.C. .3% |
| 1185 | -88.7 | PARITY GOOD |
| 689 | -89.5 | |
| 443 | -89.5 | |
| 960 | -89.5 | |
| 303 | -87.5 | |

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NORAND DATA SYSTEMS

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| TITLE | MODEL |
|---|---|

RETEST AFTER 6 day SOAK 50°C 95% R.H.
5 HOUR ROOM TEMP STABILIZATION

AMBIENT TEMP 23.5°C

| | | Δ FROM ORIGINAL |
|---|---|---|
| CONTROL GROUP | | |
| 398 | 469.9619 | Δ = -337 |
| 317 | 469.96207 | Δ = +70 |
| 650 | 450.38460 | Δ = -10 |
| 641 | 450.38718 | Δ = -90 |
| 433 | 461.06285 .06279 | Δ = +400 |
| TRIMMER REMOVED | | |
| 730 | 461.06278 | Δ = -210 Hz |
| 683 | 450.38512 | Δ = -60 |
| 722 | 450.39649 | Δ = +80 |
| 784 | 461.06083 | Δ = -290 |
| 707 | .96046 | Δ = -90 |

| MULTIPLIER DISCONNECTED | | Hz | PPM |
|---|---|---|---|
| 341 | 19.210924 | Δ = -.80 | -.42 |
| 692 | 19.581720 | Δ = -6.68 | -3.47 |
| 705 | 18.766152 | Δ = -3 | ~ |
| 728 | 19.210321 | Δ = -.30 | -1.56 |
| 721 | 19.581774 | Δ = -.13 | -.66 |

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

BCMSA006672

| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|

NORAND DATA SYSTEMS

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TITLE | MODEL

Round #2 INITIAL +22 FINAL +20

UNMODIFIED

| | | | | |
|---|---|---|---|---|
| 683 | #10 | 450.38752 | 38738 | -140 |
| 722 | #9 | 450.38742 | 38762 | +200 |
| 730 | #8 | 461.06257 | 06251 | -60 |
| 784 | #7 | 461.06253 | 06276 | +170 |
| 707 | #1 | 469.96254 | 96286 | +110 |

TRIMMER REMOVED

| | | | | |
|---|---|---|---|---|
| 378 | #52 | 469.96155 | 96125 | -300 |
| 317 | #49 | 469.96392 | 96401 | +110 |
| 650 | #1 | 450.38664 | 38670 | +70 |
| 641 | #5 | 450.38500 | 38507 | +70 |
| 433 | #6 | 461.06170 | 06182 | +120 |

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| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|
| | | | |

Norand Part No. 910018-000

NORAND DATA SYSTEMS

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TITLE B.R.S. APPLIED TO SPREAD SPECTRUM TRANSMISSION | MODEL

The concept of baud rate switching can be extended to apply to

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| WRITER | DATE | WITNESS | DATE |
|---|---|---|---|